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| 10/762,499   | 01/23/2004  | Aarti Gupta                 | A8625               | 5224             |
| 23373 7590 02/01/2010<br>SUGHRUE MION, PLLC<br>2100 PENNSYLVANIA AVENUE, N.W.<br>SUITE 800<br>WASHINGTON, DC 20037 |             |                             |                     |                  |
| EXAMINER<br>OCHOA, JUAN CARLOS   |             |                             |                     |                  |
| ART UNIT<br>2123   |             | PAPER NUMBER                |                     |                  |
| NOTIFICATION DATE<br>02/01/2010  |             | DELIVERY MODE<br>ELECTRONIC |                     |                  |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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**Office Action Summary****Application No.**

10/762,499

**Applicant(s)**

GUPTA ET AL.

**Examiner**

JUAN C. OCHOA

**Art Unit**

2123

**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 29 September 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 76-79 and 81-83 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 76-79 and 81-83 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB-06)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

### **DETAILED ACTION**

1. The amendment filed 09/29/2009 has been received and considered. Claim 84 is cancelled. Claims 76–79 and 81–83 are presented for examination.
2. As to the remarks of Applicant's representative, (see page 13, last paragraph) "If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below". Examiner contacted Applicant's representative twice and left two messages to work out some of the outstanding claims language giving rise to objections and rejections, but no call was returned.

### ***Specification***

3. The disclosure is objected to because of the following informalities:
4. Page 14 is missing.
5. Appropriate correction is required.

### ***Claim Objections***

6. Claim 81, lines 12–13 include the term "marking only flip-flops and external constraint nodes in the circuit design are marked", meaning is unclear. Examiner interprets as "marking only flip-flops and external constraint nodes in the circuit design" for examination purposes.

***Claim Rejections - 35 USC § 112***

7. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

8. Examiner notes that claims 78 and 79 were amended, however the "!" symbol is still present in the claim language.
9. Claims 78 and 79 are rejected under 35 U.S.C. 112, first paragraph, as based on a disclosure which is not enabling. The meaning of "!" is critical or essential to the practice of the invention, but not included in the claim(s) is not enabled by the disclosure. See *In re Mayhew*, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976). The disclosure refers to ' , but not !.
10. Claims 78 and 79 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for not(y), does not reasonably provide enablement for !(not(y)). The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the invention commensurate in scope with these claims. The amendment of claims 78 and 79 reads: !(not(y)). Two consecutive negatives equal a positive. The specification, while being enabling for negative(y), does not reasonably provide enablement for positive(y).
11. Claim 82 is rejected under 35 U.S.C. 112, first paragraph, as based on a disclosure which is not enabling. The meaning of "reporting a counterexample is reported if it is real and terminating the verification" is critical or essential to the practice of the invention, but not included in the claim(s) is not enabled by the disclosure. See *In*

*re Mayhew*, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976). The subject matter description of "reporting a counterexample is reported if it is real and terminating the verification" in the specification is non-existing.

12. Claim 82 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The subject matter description of claim 82, line 20: "until either there is no change in the size of the derived abstract model or" in the specification is non-existing.

13. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

14. Claims 76–79, 81, and 83 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

15. Claim 81 recites the limitation "proof of unsatisfiability" in line 14. There is insufficient antecedent basis for this limitation in the claims.

16. Claim 81 recites the limitation "satisfiability solver" in lines 14–15. There is insufficient antecedent basis for this limitation in the claims.

17. Claims 78 and 79 recite the limitation "satisfiability formula" in lines 5 and 6. There is insufficient antecedent basis for this limitation in the claims.

18. Dependent claims inherit the defect of the claim from which they depend.

***Allowable Subject Matter***

19. Claim 76–79, 81, and 83 would be allowable if rewritten or amended to overcome the rejection set forth in this Office action.

20. The following is a statement of reasons for the indication of allowable subject matter:

21. While McMillan and Amla, Automatic Abstraction without Counterexamples, (see IDS dated 8/16/08), generates an abstract model for a sequential design of an electronic circuit for verification of a given correctness property, (see pages 5–6), McMillan et al., U.S. Patent 7,406,405, discloses generating an abstract model for a sequential design of an electronic circuit for verification of a given correctness property (see Fig. 2),

Marques-Silva and Sakallah, GRASP: A Search Algorithm for Propositional Satisfiability (see reference [6] listed in the Application description pg. 3 or PTO-892 Notice of Reference Cited dated 5/15/07) discloses “dummy variables” (see page 518, col. 2, 2<sup>nd</sup>–5<sup>th</sup> paragraphs),

Baumgartner, Kuehlmann, and Abraham; Property Checking via Structural Analysis; (see PTO-892 Notice of Reference Cited dated 05/15/2007); teaches abstraction (see pgs. 3, 7, and 8),

and De Moura et al., Pre-Grant publication 2004/0019468, teaches verification based on a lazy combination of a SAT solver with a constraint solver, introducing only the

portion of the semantics of constraints that is relevant for constructing a BMC counterexample (see paragraphs [0070–3,0078,0083,0100,0142,0147,0153]).

22. None of these references taken either alone or in combination disclose verification specifically including claim 81 "(a) if the given correctness property is proved correct at a depth k, marking only flip-flops and external constraint nodes in the circuit design, based on whether their constraints appear in an unsatisfiable core generated from the proof of unsatisfiability by the satisfiability solver; otherwise, terminating verification, (b) deriving an abstract model consisting of combinational fanin cones of the marked flip-flops and external constraint nodes, (c) checking the given correctness property on the derived abstract model, and if the derived abstract model is proved correct, terminating the verification and deeming the circuit design to be correct. otherwise, increasing the depth of unrolling k and repeating steps (a)-(c) until either the given correctness property is violated at some depth or the circuit design is determined to be correct", in combination with and in the same relationship with the remaining elements and features of the claimed invention. Also, there is no motivation to combine none of these references to meet these limitations. It is for these reasons that applicant's invention defines over the prior art of record.

### ***Response to Arguments***

23. Applicant's arguments have been fully considered, and some of them are persuasive.

24. Regarding the claim objections, the amendment corrected those deficiencies.

25. Regarding the rejections under 101, Applicant's arguments have been considered and they are persuasive.
26. Regarding the rejections under 112, claims remain defective.
27. Regarding the rejection under 102 and 103, the amendment overcame all rejections and those rejections are withdrawn.

### ***Conclusion***

28. Any indication of allowability of the claims not rejected on prior art is being held in abeyance pending the manner in which applicant amends or responds to the above rejections.
29. Examiner would like to point out that any reference to specific figures, columns and lines should not be considered limiting in any way, the entire reference is considered to provide disclosure relating to the claimed invention.
30. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).
31. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of



the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

32. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Juan C. Ochoa whose telephone number is (571) 272-2625. The examiner can normally be reached on 7:30AM - 4:00 PM.

33. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Rodriguez can be reached on (571) 272-3753. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

34. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. C. O./ 1/28/2010

Examiner, Art Unit 2123

/Jason Proctor/

Primary Examiner, Art Unit 2123